

a 1 by a higher bid. Each player is allowed to edit his or her own bids, although the types of edits may be significantly restricted by the auction rules. In general, we expect that players will be allowed to increase the value of their bids. They may also be allowed to delete items from a bid (without decreasing the bid value) and to designate additional types for a bid. In some auctions, players may also be allowed to withdraw bids, perhaps subject to some penalty. This invention is not concerned with the particular bidding rules of the auction, only with the methods and systems used to select the winning bids.

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**Please replace the paragraph beginning on page 20 line 4 and ending on page 21, line 5, with the following:**

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A 2 Once a sufficient number of columns have been generated the objective functions  $w$  and the constraint matrix  $A$  corresponding to these proposals are constructed. The integer program is formulated. Instead of solving the integer program, we use commercial optimization software to solve only the linear programming relaxation of the integer program. This means that we relax the integrality constraints on the decision variable, and instead of requiring that each decision variable take either the value 0 or the value 1, we allow any value in the range  $[0,1]$ . Linear programs are significantly easier to solve than integer programs. Most mathematical optimization software that is capable of solving integer programs can also be used to solve the linear program. In our implementation we use the linear programming solver in OSL. Although the solution returned by the linear programming solver may specify fractional values for some of the decision variables, and thus does not correspond to a set of selected proposals, it provides valuable information in the form of dual variables. There is a dual variable associated with each constraint of the integer program. If an inequality is strictly satisfied, then the dual variable associated with that constraint will have the value 0. If the constraint is strictly satisfied, then the size of the dual variable gives some indication on the relative importance of the constraint. In general, the larger the value of the dual variable, the larger the "marginal value" of the resource represented by the corresponding constraint. For the constraints corresponding to item  $i$ , we can use the dual variable  $\pi_i$  as an estimate of the value of the item. Using these new estimates, we